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OIL FILM BEARING FOR ROLL NECKS WITH HYDROSTATIC SUPPORT

The invention concerns an oil film bearing for roll necks, which is surrounded or whose neck bush mounted thereon is surrounded by a bearing bush mounted in a chock, wherein the bearing bush has at least two internal hydrostatic pockets, which are arranged essentially on a common axial line and can be supplied with a pressure medium via a check valve and via bores that run inside the bearing bush, and wherein throttles in the bores ensure an optimum hydrostatic bearing, even when the roll neck or the neck bush is in a skewed position in the bearing bush.

Oil film bearings of this type are well known. They generally have two pressure zones that are displaced by 180° in a bearing bush. In each of these pressure zones, two hydrostatic pockets are axially displaced. In this regard, the hydrostatic pockets of one pressure zone are used in the operation until optimum hydrostatic properties are no longer ensured due to wear in the area of the pressure zone. The

bearing bush can then be turned 180° in the chock, so that the other two hydrostatic pockets of the second pressure zone can be used. Throttles are inserted in the four bores to the two hydrostatic pockets of each pressure zone. Due to the thin wall thickness of the bearing bushes and the resulting very small diameters of the bores, the throttles are very delicately constructed. Their purpose is to distribute the pressure medium coming from a pressure connection, at which pressure medium is present at a pressure of about 200 to 2,000 bars, as uniformly as possible to the two hydrostatic pockets of a pressure zone.

If one of the hydrostatic pockets of the pressure zone is uncovered halfway due to a skewed position of the neck bush in the bearing bush, relatively more pressure medium can flow out of the uncovered hydrostatic pocket. This would cause a large pressure drop in this hydrostatic pocket. The effect of the throttles is to limit the pressure drop in this bearing pocket. The resulting pressure difference between the two hydrostatic pockets results in the development of a correction moment, which counteracts the skewed position.

In oil film bearings of this type, four of the very delicate and very expensive throttles are housed in a bearing bush. However, only two of the four throttles are used. Since

the throttles are housed in the bores of the bearing bushes, it is possible to inspect and, if necessary, change the throttles only if the complete bearing is dismounted to allow the service personnel to get to the bores in the bearing bush. Since the throttles are very delicately constructed, they can easily become clogged, especially if the oil being supplied is not sufficiently filtered. The hydrostatic function fails if the throttles become clogged. For the aforementioned reasons, preventive inspection is possible only with a great deal of labor.

The two bores to the hydrostatic pockets are brought together in the bearing bush, so that they can be supplied by a check valve. For this purpose, in the previously known bearing bush, a shoulder is formed by very cost-intensive buildup welding in its peripheral region that is used for the connection. The two bores are joined in this shoulder by essentially radially running, intersecting bores. The check valve is axially connected at the point of intersection of the intersecting bores.

Due to the limited installation space for the bearing bush, the connection of the check valve to the bearing bush is also often the cause of operational disruptions. Leaks can easily

occur due to loosening of the high-pressure bolted connections of the check valves. Loosening of the check valves, whose purpose is to keep the pressure medium in the hydrostatic pockets, even if, e.g., the high-pressure hoses to the check valve are no longer supplying pressure medium due to a malfunction, can occur, e.g., due to faulty mounting of the check valves in the limited installation space. Since four bearings are supplied by one pressure system, the leak at one check valve can lead to failure of the hydrostatic system in all four bearings.

US 3,998,502 discloses a prior-art oil film bearing of this general type, which uses integrated bearing control devices for automatically enlarging or reducing the throttle gap and simultaneously automatically reducing or enlarging the bearing discharge gap as a function of the magnitude and direction of the bearing load. Here too, it is necessary to dismount the bearing to be able to reach the bearing control devices.

EP 1 298 355 A2 provides that both the throttles and the check valve are housed in the bearing housing. Here again, it is necessary to dismount the bearing to inspect or replace the throttles and the check valve.

The objective of the invention is to refine an oil film bearing in accordance with the invention in such a way that the hydrostatic function of the bearing is ensured in an inexpensive way and that inspection of the throttles is possible at any time.

To this end, it is proposed that the two or more bores of a pressure zone be connected with a connection block, that the throttles be accommodated inside the connection block, and that the check valve be assigned to the connection block.

As a result of the removal of the throttles from the bearing bush and their placement in a connection block, the throttles are now used in an area that is no longer dependent on the limited diameter of the bores of the bearing bushes. In accordance with the invention, it is possible to use not only throttles of the previously known type but also larger throttles, which can be manufactured less expensively and are less subject to clogging. The check valve is also no longer mounted in the limited installation space of the bearing bush but rather on the connection block, so that the connections of the check valve are more accessible, and no mounting errors occur, since there is sufficient space, and thus no leaks occur.

It is advantageous if the connection block is mounted on the chock in such a way that it is freely accessible, so that dismounting of the bearing is no longer necessary to inspect the throttles.

It has been found to be advantageous for the two or more bores of a pressure zone that lead to the two or more hydrostatic pockets to be connected with the connection block by high-pressure connections and by rigid lines. In this regard, continual mounting and dismounting of the check valve is unnecessary, since the throttles can be inspected outside of this system.

Due to the connection of two high-pressure lines, the cross connection of the bores in the bearing bush is eliminated. Consequently, the cost-intensive buildup welding of a shoulder can also be eliminated.

It has been found to be effective for the lines to consist of tubes which can withstand a large pressure but which nevertheless are elastically deformable to compensate any bearing play that may be present. For this purpose, the tubes can be configured, e.g., in the form of a loop, so that despite their rigid construction, they are capable of compensating possible relative movement between the chock, which supports the

connection block, and the bearing bush.

The invention is explained in greater detail below on the basis of an example.

-- Figure 1 shows the oil film bearing of the invention.

-- Figure 2 shows the connection of the oil film bearing with the connection block.

-- Figure 3 shows the connection block with the check valve.

Figure 1 shows an oil film bearing 1, which is mounted in a chock 2 and consists of a neck bush 3, which is mounted on a roll neck 4, and of a bearing bush 5, which is seated in the chock 2.

Two bores 6, 6', which lie partially one behind the other, are arranged in the bearing bush 5 and extend from the outer edge 7 of the bearing bush 5 to radial bores 8, 8', which terminate in hydrostatic pockets 9, 9'.

High-pressure connections 10, 10' are provided on the bearing bush 5. Rigid lines 11, 11' are attached to the high-pressure connections 10, 10' and run to a connection block 12, where they are likewise attached by high-pressure connections 13, 13' (see Figure 2). The connection block 12 is mounted on the chock 2 by bolts 14, 14'.

Figure 3 shows the lines 11, 11', which are connected with the connection block 12 by the high-pressure connections 13, 13'. The throttles 15, 15' are located in the connection block 12. After the removal of immediately accessible plugs 16, 16', the throttles can be easily removed from the connection block 12 to inspect or replace them. Sufficient room can be provided in the connection block 12 to allow the use of throttles that are not as delicately constructed as the throttles s that have previously been used in the bores of the bearing bushes. In addition, only two throttles are provided. If the bearing bush 5 is turned 180°, only the high-pressure connections 10, 10' must be detached. After a retaining bolt 17 (see Figure 1) has been removed, the bearing bush 5 can be turned 180°, and the bores, which have likewise been turned 180°, can be connected with the high-pressure connections 10, 10'. This results in a savings of two throttles. Now only two throttles are needed instead of the usual four.

Figure 3 also shows the check valve 18, which is likewise mounted on the block 12 in a way that makes it readily accessible. Due to this easy accessibility, mounting errors during the mounting of the check valve 18 are also eliminated.

List of Reference Numbers

1 oil film bearing

2 chock

3 neck bush

4 roll neck

5 bearing bus

6 bore

7 edge

8 radial bore

9 hydrostatic pocket

10 high-pressure connection

11 line

12 connection block

13 high-pressure connection

14 bolt

15 throttle

16 plug

17 retaining bolt

18 check valve

CLAIMS

1. Oil film bearing (1) for roll necks (4), which is surrounded or whose neck bush (3) mounted thereon is surrounded by a bearing bush (5) mounted in a chock (2), wherein the bearing bush (5) has at least two internal hydrostatic pockets (9, 9'), which are arranged essentially on a common axial line and can be supplied with a pressure medium via a check valve (18) and via bores (6, 6') that run inside the bearing bush (5), and wherein throttles (15, 15') in the bores (6, 6') ensure an optimum hydrostatic bearing, even when the roll neck (4) or the neck bush (3) is in a skewed position in the bearing bush (5), characterized by the fact that the two or more bores (6, 6') are connected with a connection block (12), that the throttles (15, 15') are accommodated inside the connection block (12), and that the check valve (18) is assigned to the connection block (12).

2. Oil film bearing in accordance with Claim 1, characterized by the fact that the connection block (12) is mounted on the chock (2) in such a way that it is freely accessible.

3. Oil film bearing in accordance with Claim 1 or Claim 2, characterized by the fact that the bores (6, 6') and the connection block (12) are provided with high-pressure connections (10, 10'; 13, 13') and that the high-pressure connections (10, 10') of the bores (6, 6') are connected with the high-pressure connections (13, 13') of the connection block (12) by rigid lines (11, 11').

4. Oil film bearing in accordance with Claim 3, characterized by the fact that the lines (11, 11') consist of tubes that withstand pressures above 2,000 bars and are elastically deformable to compensate possible relative movement between the bearing bush (5) and the chock (2).

5. Oil film bearing in accordance with any of Claims 1 to 4, characterized by the fact that the check valve (18) and/or the throttles (15, 15') are replaceably assigned to the connection block (12).

6. Oil film bearing in accordance with any of Claims 1 to 5, characterized by the fact that a bearing bush (5) without a shoulder is used.